TO STUDY THE DRUG PRESCRIPTION PATTERN USING "WHO CORE DRUG USE INDICATORS" IN OUT-PATIENTS IN AN OPTHALMOLOGY HOSPITAL

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INTRODUCTION

Drug utilization research was defined by the World Health Organization (WHO) as marketing, distribution, prescription and use of drugs in a society with special emphasis on the resulting social, medical and economic consequences [WHO/ DAP/93.1 Geneva, 1993. WHO, Olso, Norway, 2003]. It is an essential part of pharmaco-epidemiology which describes the extent, nature and determinants of drug exposure with the ultimate goal to use of drugs in the population [D.Lee, et al., 2005].The assessment of drug utilization was very important for clinical, educational and economic outcomes [Uppal R narak et al., 1995]. To decrease the adverse effect and increase therapeutic efficacy the evaluation of drug utilization pattern was needed from time to time. World health Organization (WHO) reports half of medicines were inappropriately prescribed, dispensed and half of all these patients fail to take them correctly.

The promotion of rational use of drugs can be achieved by periodical audition of drug utilization pattern and by monitoring the prescribing practice and drug utilization study can identify the problem related to patients and give feed back to physician which result in the rational use of medicine. Irrational use of drugs in developing countries was mainly due to irrational prescribing, administration and dispensing of the medication (Ehijie F.O et al., 2011). For evaluation of health system the drug utilization studies act as potentials tool.

To ensure safe and effective treatment periodic review of drug utilization pattern was necessary. About 90% of drug utilization (DU) index introduced as inexpensive, simple and flexible methods for assessing the quality of the drug

prescription and the remaining 10% shows specific drugs which are used for inpatient in rare condition with has drug intolerance history or adverse effect.

To improve the human health the drugs plays an important role. Drug therapy is a major component of patient care management in health care settings. The pharmaceutical products that are available with innumerable brands names flooded by prescribers and consumers often at an unaffordable cost [N.Y.Mirz, et al., 2008]. A major concern in health care system is irrational and inappropriate use of drugs has observed globally [H.V.Hogerzeil et al., 1995]. Newly developed expensive, broad spectrum antibiotics uses was readily accepted by physicians to address the rising microbial resistance that contribute to increase rates of antimicrobial resistance and health care costs [R.Lici, et al., 2007].

There has been many drug developments and introduction of new ocular therapeutic agents in the ophthalmology discipline [A.Duggiral et al., 2007, A.Leonardi et al., 2005]. Drug utilization studies were particular interesting in focusing the most frequently used group of therapeutic agents such as antibiotics. Antibiotics are widely prescribed for various ophthalmic diseases. Resistance to different class of antibiotic are evidenced and often used in ocular therapeutic [N.A.Afshari et al., 2008, P.A, Asbell et al., 2008, R.P.Kowalski et al., 2003]. Use of topical antibiotics and non-steroidal anti-inflammatory drugs are indiscriminate by the cause histological and structural changes in conjunctiva [S.A.Kumar et al., 1993 B.I.Gaynes et al., 2002]. Drug utilization trends and pattern needs to be evaluated periodically in order to improve drugs therapeutic efficacy, minimize

adverse effects and delay development of resistance [K.K.Krishnaswamy et al., 1985].

To improve the overall drug use in developing countries the international agencies like the World Health Organization (WHO) and the international Network for the rational use of drug (INRUD) have applied themselves to evolve standard drug use indicators. (Biswas NR et al., 2001) These indicators help us to improve our performances from time to time(yaseen Maniyar et al., 2011)

A drug utilization study was powerful exploratory tools to ascertain the role of drugs in the society. They create a sound socio-medical and health economic basis for making health care decisions.

- The research in this filed aims to analyze the development trends of drug usage of various levels in the health care system. The data which is obtained may give a crude estimate of the disease prevalence and the estimate of drug expenditures.

- The importance of drug utilization studies are marketing of new drugs, concerns about the delayed adverse effects of drugs , the variation in the pattern of drug prescribing and the increase in the cost of drugs.

- World Health Organization (WHO) and the International Network for the rational use of drugs (INRUD) have applied themselves to improve the overall drug use to evolve standard drug use indicators.

- These indicators help us to improve our performance from time to time. In drug utilization studies, the WHO specifies drug use indicators for

adoption. It is necessary to determine the drug use pattern and the drug use profiles are monitored by using the Anatomic Therapeutic Chemical (ATC) classification/ Defined Daily Dosage (DDD) system in order to enhance the efficacy of drug use.

The WHO defines drug utilization study is a structured process which was used to assess the quality of drug therapy by engaging in the evaluation of data on drug prescribing, dispensing and patient use in a health care environment against special emphasis on the resulting medical, social and economic consequences. (Adbulgafar O. jimoh et al., 2011). It seekes to monitor, evaluate and suggest modification in the prescribing practice with the aim of making the medical care rational and cost effective. To determine rational drug therapy and maximize utilization of resources the study of prescription pattern was very important.

One of the important transaction between the doctor and patient was prescription order (Benet et al., 1996). In this pharmacits has well defined role during dispensing and counselling time. Factors such as patients, acedamic literature, commerical publicity and regulation of government effect the precribing behaviours. For rational drug usage there should right dosage at right time, right usage and right cost for the patients. Irrational prescribing was one of global problem and this was mainly due to poly-pharmacy, use of antibiotic with out bacterial infection, less prescribing of oral dosage form by excessive use of injection,self medication and non compliance to dosing regimen (Abidi A ,et al., 2012). One of the way to incease the rational use of medicines was to prescribe medicines from the formulary but selection of drug in the formulary regarding

diseases prevalance, assured quality and aviable of correct dosage form (Quick Jd et al., 2002).

That is not easy to master the good prescribing and it is an art. Good prescribing is also as called rational prescribing which means prescribing the appropriate drug at the correct frequency of administration in the correct dosage of an appropriate formulation for the correct length of time prescribing. Sound knowledge is basis of rational and the path-physiology understanding of the diseases treatment to be done and usage of the clinical pharmacology of the drugs and maximum benefit risk ratio are achieved.

- Appropriate indication for the drug based on the diagnosis e.g. acute bacillary dysentery or a viral upper respiratory tract infection are both self limiting and do not require antibiotics.
- Minimum duration required to treat condition such as duration of treatment.
- Doses in children should be based on their body weight such as characteristics of the patient.
- Appropriate dosage regimen.
- Appropriate route of administration.
- Based on pharmacokinetics and pharmacodynamics making a rational choice of drug therapeutic considerations such as co-existing diseases, drug toxicity, drug interactions; patient compliance and cost.

- Appropriate formulation in relation to the child's age.

- Clinical decisions should be based on the best scientific evidence available at the time of seeing a patient based on evidence-based medicine.

- Based on characteristics of the disease the dosage regimens is different for the same drug in different diseases. Such as the dose is reduced in renal failure when drug is excreted renally.

A guideline for writing a good prescription by specifying the patient's full name, address, age with or without hospital case number which indicates clearly the date and the name of the drug using the approval and generic name rather than the proprietary or brand name such as specifying precisely the strength of tablets, capsules or mixtures which indicates the dose frequency and total quantity to be supplied or the duration of treatment which not leaving large blank spaces on the prescription and signing the prescription and indicating one name and one address can be possible. Idea about the prescribing practices and characterizes the early signals of irrational drug use by studying of drug utilization pattern in a particular setting. It is possible to compare drug utilization patterns between different settings with the help of WHO prescribed drug use indicators and concept of define daily doses.

To evaluate whether drugs properly utilized in terms of efficacy, convenience, safety and economic aspects at all levels in the chain of drug use the drug utilization act as important tools. Different drug utilization studies have been carried out all over the world but there are limited studies addressing drug use

patterns. Without a method of measurement and a reference standard the rational drug use cannot be defined. To make comparisons the same tools are more necessary between facilities, districts and output measure of interventions use to measure the knowledge of the prescriber. Adequate knowledge on rational drug use does not always result in rational prescribing behaviour. actual behaviour is preferred as a measurement.

Past few years the international network for rational use of drugs (INRUD) and the WHO Action Essential Drugs Programmer have done testing a set of quantitative indicators to measure some key aspects of prescribing and the quality of care. The practice that shows that the prescription should be compared with an agreed treatment protocol . This was called a core principle of medical audit core principle that becoming more and more important.

Audit needs a standard and a standard needs consensus. The prescribers should be agreed by treatment protocols and prescribing policies at the hospital. one can distinguish between three levels in a national perspective such as the total range of drugs approved for sale and the country usage by the regulatory authorities usually defined in this range the national formulary these are sub-divided by level of care and d by a national formulary committee development and a hospital formulary and departmental a clinical department or a group of practitioners.

By using refer to various interventions such as educational and regulatory promotion of rational prescribing can be done .Printed materials, seminars, bulletins and face to face intervention are included in educational strategies. To

refer various restrictions on prescribing the managerial method which are used such as restrictive lists a maximum number of drugs per prescription, budgetary or cost restrictions, endorsement by higher qualified consultants, price measure, structured prescription forms or a maximum duration for inpatient prescription Regulatory of patient co-payment strategies include procedures to critically evaluate drugs and product information done before market approval is done. Over the counter such as scheduling drugs for different sales and prescriber specifying for each drug a minimum level such as no injectable antibiotics at health centers.

Many studies have critically reviewed the evidence available for identify the most effective interventions and the provisional conclusions may be done. The printed materials influence by prescriber behaviour is a important observation and that of short duration. The main reason for incorrect prescribing is a lack of knowledge and prescribers not have the correct information on their prescribing. This was not any always the case in view of the many other factors influencing like drug promotion, intentional use of placebo drugs and prescriber preference based on personal experience rather than peer reviewed standards. Factors such as influence technical information on cost and side effects of the drugs. Proven cost-effective interventions was face to face education focused on a particular prescribing. On the basics of the clinical impression ribbing problem in selected individuals structured prescription forms and focused educational campaigns together that discussed in treatment guidelines. It can applies to essential drugs lists and treatment guidelines these is just distributed to prescribers without an introduction campaign and intensive follow-up. Especially the prescribers have not been involved in the development process.

Formulary

It's a list of drugs selected based on the criteria of safety, efficacy and cost to meet the major requirement of hospital. In ophthalmology formulary plays an important Formulary that describes each and every medicine or drug enlisted in formulary list formulary includes strength, dose, dosage form, adverse effects etc of drugs.

The formulary system consists of medical staff of an institution, working through P&T Committee which evaluates, appraises and selects from among the numerous available drug entities and drug products which consider most useful in patients care. Formulary system is a organized administrative process that health professionals evaluate comparative products publish and revise their decisions, inform appropriate staff members and provide guidelines for continuing the use of non formulary drugs. An effective formulary system does not allow non formulary drugs to be routinely available form the pharmacy. The formulary system was that an important tool for assuring the quality of drugs to be routinely available from the pharmacy. For assuring the quality of drug use and controlling the cost the formulary system acts as important tool.

For prescribing, dispensing, procuring and administering of drugs under either their non proprietary or proprietary names the formulary plays important role. And each selected medicine must be available in a form in which adequate quality that include bioavailability can be assured its stability under the anticipated conditions of storage and use must be established when two or more medicines appear to be similar in the respects the choice between them should be made on the

basis of a careful evaluation of their relative efficacy, safety, quality, price and availability in cost comparison between medicines the cost of the total treatment and not only the unit cost of the medicine be considered. Where drugs are not entirely similar selection should be made on the basis of a cost effectiveness analysis. The choice may also be influenced by other factors such as pharmaco-kinetic properties. By local considerations such as the availability of facilities for storage or manufactures. Most essential medicines should be formulated as single compounds. Fixed ration combination products were acceptable only when the dosage of each ingredient meets the requirements of a defined population and when the combination has a proven advantage over single compounds administered separately in therapeutic effect and safety or compliance.

Principles of formulary list management are

- For the needs of patient the selection of drugs is done
- The conditions identified for the select the drugs
- Both therapeutic and pharmaceutical the void duplications is done whenever possible use evidence-based information
- For the addition of new drugs only decision is taken by health-care staff, not by the pharmaceutical industry.
- Require that requests for the addition of new drugs are justified using documented evidence on efficacy, relative efficacy, safety and comparative cost effectiveness and that the person requesting any new drug declare any conflict of interest.

Role of Pharmacist

- In developing policies and procedures governing the hospital formulary Pharmacist in the DTC has a key role
- For the preparation of hospital formulary the chief pharmacist has the primary responsibility
- Ensure that quality of drugs is not compromised by economic considerations done by pharmacist

Benefits of the hospital Formulary

Cost containment equity in access to essential medicines: Procuring fewer items in large quantities results in more competition and economies scale with regard to quality assurance, Procurement, storage and distribution. Such economies can lead to improved drug availability at lower costs, so benefiting those who are in most need. Improves quality of care: Patients will be treated with fewer but more cost-effective medicines for which information can be better provided and prescribers better trained. Prescribers gain more experience with fewer drug interactions and adverse drug reactions better. Quality of care will be further improved medicine selection is based on evidence based treatment guidelines.

Some of the formularies used as India Standard references used in many hospitals such as WHO Formulary, British National formulary, Indian National Formulary, Hospital formularies originally started life in hospital as a collection of commonly prescribed pharmaceutical preparations produced mainly for reference purposes.

Drug use indicators

Background on the development of drug use indicators

Some of the core indicators are used in early studies in Yemen and Uganda. It was used to quantify the impact of essential drugs programmes. INRUD (International Network of Rational Use of Drugs) network member undertook systematic programmes to develop field test and refine drug use indicators during the time of the early work building.

The indicators was limited on the basis of experiences that related to facility-specific data, eliminating which had originally been included to describe the situation in the community. To limit the number of indicators an explicit effort was also made, with the intention of defining a core set that could be collected in any health system which yield the maximum of information with the minimum of effort. In 1991 there was review of the revised indicator and the present set of indicators was finalized in 1992.

Types of indicators

The drug use an indicator was developed to measures performance used in three general areas related to the rational use of drugs in primary care.

- Practice of health providers on pharmaceutical prescribing
- Key elements such as patient care covering both pharmaceutical dispensing and clinical consultation.
- Availability of facility-specific factors that support rational use, such as minimum pharmaceutical information and key essential drugs.

Types of drug use studies with indicators

Describing practices in a representative sample of health facilities was measured by using facility-based indicators. Although their drug use was influenced by many important factors at other administrative levels of the health system and also in the community. The drug use indicators cannot measure these factors.

In a cross-sectional survey the drug use indicators can be collected at one time or they can be measured at different points in time to assess change in performance. Depend up on the purposes of a particular study the data was collected from number of health facilities and the process of collecting and interpreting data for supervision is quite different from the sample survey approach.

The prescribing indicators can be based on either retrospective or prospective data. For retrospective, the data was extracted from medical records kept at the health facilities these data describe drug use during patient visits that took place in the past, preferably over a one-year period to control for seasonal

variations. For prospective, the data was collected from patient about drug use during the visit of the indicators survey. The weaknesses and strengths of prospective versus retrospective data depend on the methods for collecting.

Organizing Steps and methods of a drug use study with indicators

The indicators should be measured in a standardized way during study to produce the results that was reliable and comparable. These below list describe the sequence of steps needed to carry out a basic drug use study using the indicators.

Basic steps of drug use study as follows

- Specifying the objectives.
- Develop methods for measuring indicators.
- Deciding the type of prescribing data to sample.
- Design of data collection form.
- Collect data from patients and health facilities.
- Record data for measuring of indicators.
- Enter the data on data collection form or cases recorded form (CRF).
- Develop summary tables or figure.
- Follow up.

Core drug use indicators

Core drug use indicators a referred as small number of basic indicators. These do not need any national adaptation and used for inclusion in any drug use study by using these indicators. This indicator was highly standardized and useful to know the short coming in prescribing writing and allows improving the performance from time to time. The important aspects of drug utilization cannot be measured because they would require more extensive and more intensive methodologies and varied sources of data. It provides a simple tool for quickly and reliably assessing a few critical aspects of pharmaceutical use.

Group 1: Prescribing indicators

The performance of health care providers related to the appropriate use of drugs in several key dimensions was measured by prescribing indicators. During retrospectively study the data was collected from data recorded in historical medical records and in prospectively study it was done by observing the a group of patients attending the clinic on the day and the data was collected. During the data collecting for the core prescribing indicators the data about the signs and symptoms does not required because the samples of clinical encounters cover a broad spectrum of health problems. The extent of rational drug use can be measured by core drug use indicators.By using patient, dispenser and prescriber the drug use pattern can be assessed . To monitor the drug use in standardized way core drugs use indicators are used.(Bimo et al.,1991)At the prescribe level the improvement of patient health and quality of life will result in rational drug use. (Chedi BA et al.,2009).

General prescribing tendencies within a given setting and independent of specific diagnoses .are measured by using core drug use indicators. The data for measuring the prescribing indicators can be recorded on forms. Recording the names and amounts for each drug prescribed are required for the detailed prescriber indicator form. The form contains information on patient, prescriber and health problems of the patient. Each indicator entered directly in to the field which was required by the ordinary prescriber indicator form. Advantage of this was to be produce immediate summaries of the indicators and its disadvantage is that fewer possibilities exist to later validate the data. The detailed form can be used for used in the prescribing indicators.

- Average number drugs per encounter.
- Percentage of drugs prescribed by generic name.
- Percentage of encounter with antibiotics prescribed.
- Percentage of encounter with injections prescribed.
- Percentage of drugs prescribed from formulary.

Average number of drugs per encounter

Average number of drugs per encounter was one of the components assessed by using prescribing indicators and average value ranges from 1.6 to 1.8. It was use to measure of polypharmacy degree. The combination drugs are counted as one and average was measured by dividing the total number of different drug products prescribed by ophthalmologist or physicians by the number of encounters

surveyed. It act as important index for drug utilization review and useful for educational intervention in prescribing practice. When values of average number of drugs per encounter was increase result in the decrease of therapeutically correct drugs, lackness of prescriber therapeutic training and appropriate diagnostic equipment treatment of the common illnesses financial and above factors encourage polypharmacy.

When value of average number of drugs per encounter was decrease cases such as absolute constraints in the drug supply system that available for very few drugs, the limit prescribing of the number of drugs in the administrative regulations and the "leakage" of drugs from the system. In economic factors such as the drug revolving amount in hospital that increases pressure on prescribing, the physicians gets profits by selling of dispensed drugs, user fees level and fees obtained during visiting of patients. In Community characteristics such as the different age of people, different in case mix gives information observed different in prescribing and example such that increase proportion of older people with multiple disease and the patients need more drug in some facilities.

Percentage of drugs prescribed by generic name

Percentage of drugs prescribed by generic name was one of the indicators assessed by using prescribing indicators. It was used to measure the generic name prescribing tendency of prescriber and example such as vitamin A & vitamin C used in ophthalmology perception pattern. It was measured by dividing the number of drugs prescribed by generic name by the total number of drugs prescribed then this value was multiplied by 100. Prescriber factors such as knowledge of

ophthalmologist or physicians about correct generic names for most drugs and the pharmaceutical representative's visits the prescriber regularly and promotional material given by the representative's and during training period of the prescribers these factors increase generic prescribing tendency. In Health problem factors such as particularly problematic of the different classes of drugs in the system generic form of treatment is not supplied.

Percentage of encounters with an antibiotic prescribed

Percentage of encounters with an antibiotic prescribed was one of the component assessed by using prescribing indicators. It was measured by dividing the number of patient encounters in which an antibiotic was prescribed by the total number of encounters surveyed, then the value was multiplied by 100 and it was used to measure the antibiotic prescribing tendency of the prescriber. In ophthalmology antibiotic was prescribed in form of drops, ointment and gels. Increasing tendency of antibiotic prescribing depends on the patients' economic condition and patient demanding quick relief from the infection also increase in antibiotic prescribing tendency.

Percentage of encounters with an injection prescribed

Percentage of encounters with an injection prescribed was one of the component assessed by using prescribing indicators. It was calculated by dividing the number of patient encounters during which an injection are prescribed by the prescribers by the total number encounters surveyed then the value was multiplied by 100. Possible influences on injection use such as the beliefs and attitudes of patients and the relative efficacy of injections versus oral medications. In eye

hospital the prescribing of injection was less because the rate of injection was very high.

Percentage of drugs prescribed from formulary

It was measured by dividing the number of products prescribed which are listed on local formulary of hospital or which are equivalent to drugs on the list by the total number of products prescribed and the value was multiplied by 100. Percentage of drugs prescribed from formulary always high because the physicians or ophthalmologist prescribe drugs from their formulary.

Measuring prescribing indicators tasks

They are based on character seen in little samples of patient encounters which was collected prospectively or retrospectively from health facilities group. The first two tasks for measuring prescribing indicators were collecting of information about the patient details through patient consent form and also through interview with patient.

Group 2: Patient care indicators

Patients care indicators describe more details amount interaction between physicians and patients. A patient enters the physician or ophthalmologist room with number of symptoms, complaints and also with their care expectation and the patient leaves from room with a package of drugs or with a prescription. They do not capture many fundamental issues related to the quality of treatment and examination like the prescribing indicators. The content of interactions between patient and health worker assessed by a proper evaluation of quality of care and

beyond the scope of a limited set of core indicators which are both practically and technically. By using patient care indicators detail examination of patient-provider interactions can be done and to exploring more details in the motivations and regarding the belief use of drugs. All the data's was collected from the health facility and data's are recorded in patient care form.

The adequacy of patient care was measured by observing a sample of patient encounter which occur normally and interviewing the patient after consultation and dispensing period by using the patient consent form. In measurement of consultation time interview was taken after patient receiving the medication and the interview was not taken before the patient receiving the medication because it will affect the patient flow and threatening to health workers and the interview should away from main clinic area. In measuring of consultation time in case such as the patient enter the physicians room one by one and time between entering and leaving the room was noted but in other cases such as multiple patients seen by multiple provider in a single consultation room and time was measured during individual consultation begins and ends. For dispensing time measurement the time was recorded between beginning and ending of patient interaction with dispenser during dispensing.

Patient care indicators

- Average consultation time.
- Average dispensing time.
- Percentage of drugs actually dispensed.
- Percentage of drugs adequately labeled.

Average consultation time

Consultation time measured by time spend by that medical personnel's with patients the during process of consultation and prescribing. The consultation time was time between patient entering and leaving the consultation room and waiting time was not included in the consultation time and average was calculated by dividing the total time for a series of consultations by the number of consultations. In ophthalmology hospitals consultation time was high because the patient has to be checked their eye in the optometry before the consulting with the ophthalmologists. Consultation time also decreases through effective communication about illness and physicians prescribe the drugs faster. So the characteristic of patient-provider interactions plays an important role in consultation time.

Average dispensing time

Dispensing time measure by the time spent by the patients in the pharmacy during the dispensing of prescribed drugs. Only the time between arriving and leaving at the dispensary counter was taken for calculation. In ophthalmology the average dispensing time should be high due work load of the pharmacist during the dispensing process. Waiting time is not taken for included and average was calculated by dividing the total time for dispensing drugs to a series of patients by the number of encounter. Many factors affect the dispensing time such as layout of the pharmacy, dispenser workload and time spent by pharmacist to explain the details about usage the medicine. Mainly in ophthalmology department pharmacist has high work load because ophthalmology prescription mainly contain drops and

ointment they are prescribed in different doses with regular intervals pharmacist should explain details about the correct usage of the medicines and these increase the quality of the interaction between dispensers and patients result in the rational use of drugs.

Percentage of drugs actually dispensed

Drugs actually dispensed measure the degree to which health facilities able to dispense the drug which are prescribed. Information about drugs prescribed and drugs actually dispensed at the health facility was collected and it was calculated by dividing the number of drugs actually dispensed at the health facility by the total number of drugs prescribed and the value was multiplied by 100. The health facility does not dispensed all the prescribed drugs because drugs which are usually available are out of stock and the drugs are intentionally prescribed to be purchased in the private sector. To measure the degree to which drugs must be obtained outside the health facility provides some indication about the reliability of drug supply as well as how prescribing choices match the range of pharmaceuticals available in the system.

Percentage of drugs adequately labeled

Percentage of drugs adequately labeled was one of the component assessed by using patient indicators. The degree to which dispenser's record essential information on the drug packages that dispense was measured by using these indicators. It was calculated by dividing the number of drug packages containing at least patient name, drug name and when the drug should be taken by the total number of drug packages dispensed, multiplied by 100. In ophthalmology drugs

are dispensed in packed forms so calculation of percentage of drugs adequately labeled was not necessary.

Patients' knowledge of correct dosage

It was measured by the effectiveness of the information given to patients on the drug dosage schedule and they are collected through interview and later they recorded in the forms. It was calculated by dividing the number of patients who can correctly report the dosage schedule for all drugs, by the total number of patients interviewed these value was multiplied by 100. Patients' knowledge can be evaluated by the prescribed dosage has been recorded on the drug package. The necessary data such as drug name, administration time and quantity of drug are available in written form the knowledge of the patient can be evaluated against this record. These depends on the level of pharmaceutical knowledge the data are collected by pharmacists or other health workers familiar with drug names and dosage and possible for evaluate the adequacy of patients' knowledge directly, and simply record each patient interviewed as having adequate knowledge. Patient knowledge of correct dosage can be access by written prescription or to a patient card against which patient's knowledge on the dosage schedule can be checked or access to standards for way of each common drug is supposed to be used. Investigators must be trained to evaluate patient knowledge during the interview or to record later patient responses

Group 3: Health facility indicators

Many features of the Health facility indicators were influenced by working environment and the ability to prescribe drugs rationally. Adequate supply of drugs

from formulary was one of the important components. Without these it was difficult to function effectively for health personnel. The data for these facility indicators can be recorded on the forms and by using these data calculation was done.

- Availability of drugs from formulary.

Availability of drugs from formulary

It was used to the check available of local formulary at health facilities. The list consists of different levels of care by comparing with WHO recommendations. They contain therapeutic guidelines and descriptive information about medicine. When formularies clean with unbroken binding and dirty indicating that it has been used by the health facility. The physicians explain the purpose of the essential drugs list (EDL) and individual facilities consult the list with health personnel who responsible for drug procurement during time of taking purchase decisions.

Complementary indicators

This indicator was difficult to measure and it cannot be collected reliably. This indicator was less standardized and depends on local variables and it should be defined before the usage of indicator.

- Patient treated without drug.

- Drug cost spends on injection.

Patient treated without drug

Patient treated without drug was one of the component assessed by using complementary indicators and it was use to measure the degree to which primary care prescribers treat patients seeking curative care with non-pharmaceutical therapies and measures the proportion of patients who are counseled or treated without drugs .In ophthalmology outpatient department (OPD) most of the cases patient was treated without drugs and referred to the use glasses. Percentage was calculated by dividing the number of consultations in which no drug was prescribed by the number of consultations surveyed.

Drug cost spends on injection

Drug cost spends on injection was one of the component assessed by using complementary indicators and it was use to measure the overall cost impact of injection forms used in drug therapy. It was calculated as the cost for all injections divided by the total drug costs. Possible influences on injection use such as the beliefs and attitudes of patients, health providers about the relative efficacy of injections versus oral medications. Prescribers report patient demand as an important factor in determining injection use. Observations of clinical encounters support these factors about availability of injections outside the public health facility and the competition with the private injectionists is important factor for patient loyalty.

DIFFERENT CLASS OF ANTIMICROBIAL AGENTS USED IN OPHTHALMOLOGY

In ophthalmology the use of antibiotic were very high. For all the medical specialties including ophthalmology the principle of antibiotic was same. In hospital antibiotics are the commonly prescribed (Faryna A et al.,1987) The increase use of antibiotics causes increase in drug resistance of organisms.(Sang-HeumParketal.,2012) By setting certain standards at all levels of health care delivery systems the quality of treatment can be improved. One of the main aims of the studying the prescribing pattern was to make patient care reasonable and effective by process of evaluating, monitoring and suggesting modifications in the practitioner's prescription habits.

By studying antibiotic usage in prescriptions pattern we can reduce problem rises from multiple antibiotic usages (Shankar RP et al., 2012). The resident bacteria of the environmental bacteria or the conjunctival sac infection can establish by fungi and need to be treated with antibiotics. Infections arising from other parts of the body may affect the eye such as endogenous. A large repertoire of antibacterial and antifungal antibiotics such as tablets eye drops, ointments and parenteral at ophthalmologist disposal.

Resistance of antibiotic in eye infections is a matter of concern to the ophthalmologists and microbiologists. During treatment of systemic diseases the source of resistant bacteria or fungi in eye infections is an outcome of the organisms acquiring resistance. This review presents the Indian perspective of antibiotic resistance among bacteria and fungi causing eye infections. The topical

instillation of antimicrobial drug is therapy for most eye infections. The patient is given a topical commercially available eye drop and fortified eye drop with or without systemic treatment for bacterial and fungal keratitis. Frequency of instillation varies from disease to disease.

At birth Micro-organisms are closely associated with the eye forming the microbial flora of the external ocular surface and the inner parts of the eye remain sterile. This shows micro-organism attack the in earlier stages and gives import the earlier periods. The number and virulence of the invading organisms play an important role in launching an infection and mechanisms in the extra ocular surface protect the eye and only a breach in surface epithelium due to lowering of local or systemic immunity may predispose the eye to infections.

Routes such as topical, subconjunctival, intraocular several commercial eye drops on the eyes in are amenable to antibiotic therapy the required concentrations are used that may achieve bio-availability of the drugs higher than minimum inhibitory concentrations (MIC) for the offending organisms. Antibacterial fortified topical drops are prepared from parenteral drugs by aseptically. To make fortified drops runs the risk of contamination by using distilled water as solvent. To avoid contamination these are preferably dissolved and diluted in artificial tear preparations.

Antibacterial fortified topical drops are prepared from parenteral drugs by aseptically. To make fortified drops runs the risk of contamination by using distilled water as solvent. To avoid contamination these are preferably dissolved and diluted in artificial tear preparations. For many intraocular infections with or

without systemic therapy intravitreal therapy is preferred. Such condition sub conjunctival and subtenant injections may be preferred.

The rationale selection of antibiotic can be done by the assay of bactericidal activity, diagnosis and sensivity. The clinical impression basis the diagnosis can be done mainly by the selection of the drugs for causative organism these are mainly depend on the infection site, patients age and where these infection are acquired. The eye was particular suitable for the local application of antibiotic and during inflammation of eye. The use of systematic antibiotic was limited because poor penetration of antibiotic into eye through blood eye barrier. In ophthalmology different class of antimicrobial was used and most commonly used antibiotic in ophthalmology as follow.

- Fluroquinolones
- Chloramphenicol
- Macrolides
- Amino glycosides
- Sulfonamides
- Penicillin's
- Polypeptides
- Fusidic acid

Fluroquinolones

Fluoroquinolones were most commonly prescribed antimicrobial agents in ophthalmology and belong to the family of quinolones. The newer fluoroquinolones are broad-spectrum bactericidal drugs with high conjunctival concentrations. They are highly used due to better penetration power and much wider spectrum of antibacterial activity. Gatifloxacin, moxifloxacin, ofloxacin and ciprofloxacin mainly included in fluroquinolones. Ciprofloxacin and ofloxacin are available for severe ocular infections. They provide good ocular penetration and are at least as effective as chloramphenicol or tobramycin in bacterial conjunctivitis they are more powerful antibiotics being the only monotherapy for severe bacterial keratitis.

Chloramphenicol

Chloramphenicols were one of the most widely used antibiotics in the treatment of ocular infection. It has bacteriostatic activity and effective against a wide variety of Gram- negative and Gram- positive bacteria. It has little tendency to produce allergic reaction so chloramphenicol was ideally suited for local application. Chloramphenicol is a bacteriostatic antibiotic which inhibits protein synthesis. It has activity against a wide range of bacteria, including Streptococci, Pneumococci and Corynebacteria. Chloramphenicol is widely available as 0.5% drops and a one percent ointment,

Macrolides

It was broad-spectrum antibiotics. Azithromycin is most widely used macrolide antibiotic in eye infection it was used for indication of eye infection such as bacterial conjunctivitis, blepharitis and trachoma and exhibits potent anti-inflammatory activity. Clarithromycin, roxithromycin and erythromycin are some of macrolide antibiotic used in eye infection.

Aminoglycosides

Aminoglycosides were bacterial antibiotic having same general pattern of the action. Tobramycin is most popular topical antibiotic of this family used in the ophthalmology and Gentamycin was one of the most commonly used aminoglycosides antibiotic for acute infection. Amikacin, Neomycin are some of the aminoglycosides antibiotic used in eye treatment. All of the aminoglycosides are rapidly bacteriacidal and inhibit protein synthesis, ultimately producing cell membrane destruction in bacteria, These are a generally toxic group of antibiotics that are of restricted utility in systemic disease due to oto-toxicity and nephrotoxicity. Topical agents are toxic to corneal epithelium and not have any systemic toxicity

Sulfonamides

Sulfacetamide was one of the most commonly used Sulfonamides in eye treatment. Sulfacetamide is a synthetic sulfonamide that inhibits bacterial dihydrofolate synthetase bacterial enzyme responsible for the conversion of *p*-amino benzoic acid (PABA) into folic acid.

Penicillin's

Penicillin's are seldom used as topical agents in ocular infections. cephalosporins are penicillin-like antibiotics there are no commercial ocular preparations of cephalosporins for the treatment of severe infective keratitis and cephalosporins are generally restricted.

Polypeptides

Bacitracin and polymyxin B are some of polypeptides used in eye treatment. Bacitracin was effective against gram positive and gram negative bacteria and polymyxin B was against gram negative bacteria only. Polymyxin B is bactericidal for a variety of gram-negative organisms. It increases the permeability of the bacterial cell membrane by interacting with the phospholipid components of the membrane. Bacitracin is bactericidal, inhibits bacterial growth through prevention of cell wall subunits being added to the peptidoglycan chain.

Fusidic acid

It is useful alternative to chloramphenicol in the treatment of conjunctivitis. Fusidic acid acts in both a bacteria static and bactericidal manner and is very effective against Gram positive bacteria. This antibiotic also inhibits protein synthesis in bacteria to produce its antibiotic effect. Fusidic acid is available as a viscous gel and requires only two to three times daily application, this may produce a better compliance than the four times daily application needed for chloramphenicol. Fucithalmic is the first-line treatment for bacterial conjunctivitis and blepharitis. It has developed resistant strains quickly and it is ineffective

against Gram negative bacteria. Bacterial conjunctivitis is often a self-limiting condition.

FIXED DOSE COMBINATION USED IN OPHTHALMOLOGY

In indian pharmaceutical market Market Fixed Dose Combination are highly popular it was also called as Combination drugs. In this one or more active pharmaceticual indergients present in the single dose formulation and developed to target multiple diseases or single diseases. In opthalmology fixed dose combination are used widely. The combination of NSAIDS and Steroids, Antibiotic and Steroids are mainly used in ophalmology.

Some of them are diclofenac with seratiopeptidase and ofloxacin with dexamethasome. Corticosteroids provide local anti-inflammatory activity. Dexamethasone, hydrocortisone, Loteprednol and prednisolone provide local anti-inflammatory activity. Loteprednol is an analog of prednisolone and induces slightly less elevation of intraocular pressure (IOP) compared to prednisolone. Fixed Dose combination reduces pill burden to the patients and improved medication compliance. The intergident used in fixed dose combination acts in different mechanism and quick relief from diseases. In opthalmology the Fixed Dose combination are widely used in treatment of inflammation and glucoma.

LITERATURE REVIEW

Yasmeen Maniyar, et al., (2009) reported study in drug Utilization study in the ophthalmology department of a medical college. The study was about the concern regarding the prescription, irrational production, and the drug usage. The study was conducted to evaluate the pattern of prescription and the use of drugs in the outpatients ophthalmology Department (OPD). In this study about 1322 prescriptions was collected from prescriptions of 660 outpatients were audited by using a specially designed form and analyzed for the following such as average number of drugs per prescription, the treatment duration, the dosage form, administration frequency, the number of encounters with antibiotics and the percentage of drugs prescribed by their generic names. The prescription analysis showed that the average number of drugs per prescription was 2.0%. The study shows minimum in Common prescription writing errors and there was no evidence of polypharmacy. Treatment duration and prescribing by the generic names was low.

Prajapati, et al., (2008) evaluate the drug use for rationality with the help of WHO core drug prescribing indicators, other prescribing parameters and drug use studying ophthalmology outpatient department (OPD). It was a prospective study at a tertiary care teaching hospital. The study was carried out at ophthalmology outpatient department of a tertiary care teaching hospital. The study period was six months and total 647 patients were included during the study period shows that the common prescription writing error such as therapy duration, frequency of administration and dosage form was low. This study shows less in

polypharmacy. The limited use of injections and drugs was majority prescribed from the hospital formulary drug list. Generic name prescribing was very low and antibiotic usage was little high. The Study was useful for find out early signal of irrational drug useby auditing large number of prescription must be followed by education of the prescriber on rational drug therapy for benefits and safety of patients.

PoojaPrajwal, et al.,(2013) done the study about drug utilization pattern in ophthalmology department at a tertiary care hospital to assess the average number of drugs per prescription, drugs formulations being prescribed, different categories of drugs being prescribed and these category most often used in ophthalmology. This is a retrospective hospital based study carried out in the institute of ophthalmology department and one year was the study period. Total number of prescriptions analyzed was 3543 in which total of 15,324 drugs were prescribed.

There was minimum in prescription writing errors by avoiding irrational prescription. Treatment duration and generic name prescribing was very low. The study concludes that at maximum places there was overall impression of rational prescription. This kind of studies shows prescriber make more conscious at regular intervals when prescription was audited and also would bring an last to the varied side effect uncounted due to polypharmacy. The study shows periodical auditing of prescription will help to measure the impact of intervention on the prescription pattern and the eye diseases are usually not sex linked but may be age related. The study supports the using the topical preparation for treating eye diseases as they

has action on specific site, there was fewer side effect by less systemic absorption and convenient for patient use.

Meenakshi Nehru,etal., (2003) undertaken the study with the aim of the drug use pattern and drug utilization study in ophthalmology outpatient department in government medical college and to evaluate the drug use for rationality with the help of WHO core drug prescribing indicators and other prescribing parameters. The study was carried out at ophthalmology outpatient of a tertiary care teaching hospital. The study period was six months and total 647 patients was patients were included during the shows that common prescription writing errors such as therapy duration, administration frequency, low dosage form and generic name prescribing was very low.

The study showed that to maintain the number of drugs per prescription as low as possible since higher value will leaded to increased risk of drug interaction, development of polypharmacy, adverse effect and increased cost of the drugs to patient. This study showed a remarkable restraint on prescribing, irrational drug combination and awareness to avoid polypharmacy.

ShaikUbeduila, et al., (2011) find out the prescription trends in department of opthamology with special emphasis on utilization pattern of antimicrobials. Prescription from both outpatient department(OPD) and inpatient department (IPD) were collected and analyzed for following such as average number of drugs per prescription, percentage of drug prescribed by generic name ,dosage frequency and treatment duration, disease distribution, drug prescribed from essential drug list or formulary and percentage of encounter with

an antibiotic prescribed. To reduce the economic burden to the patient's suggestion was given to the doctor to prescribe drug among the hospital formulary. The relief of patient from diseases in a short span and with less cost by preferring the complete prescription with less number of drugs, proper dosage form and frequency of administration with correct duration of the therapy.

Kanchan Kumar et al., (2008) conducted retrospective based study of rational use of drug among ophthalmology inpatient of government teaching hospital and investigate the nature of utilization of drugs in respect of rationality correlating the clinical and forensic pharmacology. The study samples was Prescriptions in the Bed Head Tickets (BHT) which was analyzed according to the WHO/ INRUD Indicators, incurred cost per day prescription calculation and commonly prescribed drugs studies. The study shows prescribing practices were not always in accordance with the WHO criteria for rational use of drugs. This study indicates that there was need to provide more inputs to the ophthalmologists to promote rational use of drugs. Study shows that scope for improvement of prescribing habits through decreasing the cost by rational use of antimicrobial agents, prescription by generic name and reducing polypharmacy. The study shows there was a need for prescribing guidelines development and educational initiatives to encourage the rational use of drugs. Carefully formulated treatment plan was crucial for avoiding both malpractice litigation and tragic outcomes. The varied price of the individuals and fluroquinolones formulation to the varied range of cost per day per prescription.

Bhavesh.k.lalan, et al., (2012) reported drug prescription pattern of outpatient in a tertiary care teaching hospital. It was cross sectional, descriptive study was conducted in outpatient department. Twelve hundred prescription were randomly collected and recorded over a 'prescribing form' over 10 days and the data recorded was analyzed using WHO 'prescribing indicator form' In the study prescribing practice are not satisfactory and suggested as polypharmacy. The study created awareness about the rational use of drug by giving feedback to the prescriber, there was lack of awareness of essential drug list (EDL) and polypharmacy over prescription of antibiotics.

Pradeep R, et al., (2009) conducted study of drug utilization study in ophthalmology outpatients at a tertiary care teaching hospital. It was a observational, prospective and cross sectional study. In this study prescription of 600 patients treated was collected and analyzed by using WHO prescribing indicators and additional indices. The study indicated an poly-pharmacy awareness but showed sample for improvement of ophthalmologist to selection of essential drug from essential drug list (EDL) and prescribe drugs by generic name. It was knowledge based study and in accordance with the accepted pattern of treatment of ocular diseases a rising trend in the prescribing of topical anti-allergy and ocular lubricants. It was a quantitative drug utilization type study with WHO/INRUD core prescribing indicator and therefore the appropriateness of drug choices and determining of diagnosis was above the scope of prescribing indicator.

AIM AND OBJECTIVES

Aim

To study the drug prescription pattern using "WHO core use indicators" in out-patients in an ophthalmology hospital.

Objectives

Primary objectives:

- Investigate drug use, using the "WHO core drug use Indicators.
- Study the drug prescription pattern in the ophthalmology.

Secondary Objectives:

- Understand in detail about the individual components about the" WHO core drug use indicators" with reference to ophthalmology practice.
- Understand anti microbial prescription frequency in ophthalmology hospital.
- Indentify fixed dose combination if any, and understand the occurrences rate.
- Evaluate the drug class and frequency in prescription.

PLAN OF WORK

The present dissertation work was planned to study the drug prescription pattern using "WHO core use indicators" in out-patient in an ophthalmology hospital.

The present dissertation work was done in 4 phases

PHASE-1

- Selection of topics.
- Literature survey.
- Preparation of study protocol.

PHASE-2

- Ethical clearance brought.
- Hospital visit and explain about the study in detail to physician.
- Getting approval from hospital.

PHASE-3

- Obtain patient consent through form.
- Obtain patient data from case sheet.

PHASE-4

- Analysis of data.

METHODOLOGY

This chapter comprises the study site, study design, study period, study population, study criteria, data source, data analysis etc.

STUDY SITE

This study was carried out in "**I-VISION EYE HOSPITAL**" located in the Koorkenchery, Thrissur (dist) of Kerala specialized for eye treatment.

STUDY DESIGN

Observation study at eye hospital located in the Koorkenchery, Thrissur (dist) of Kerala.

STUDY POPULATION

Totally 763 prescription of patient was collected, Patient data was collected from patient file, patient consent through a form and interview. Collected data was utilized for the study.

STUDY PERIOD

Present study was carried out at eye hospital in Kerala over 10 month between MAY 2013 to FEB- 2014.

STUDY CRITERIA

INCLUSION CRITERIA

- Patient of all age groups. (Patients age ranges from 6 months to 90 years)

- Patient of Either gender
- Patient with discharge and Itching of eyes.
- Patient with swelling and blurring of eyes.
- Patient with Injury in eyes.

EXCLUSION CRITERIA

- Patient who suffer from refractive error.
- Post operative therapy patients.
- Patients in diagnostic test procedure.
- Repeat attendance of patients.
- Surgery patients.

METHOD OF DATA COLLECTION

A suitably designed data collection form was used to collect patient demographical data which include age, sex, current problem, history, diagnosis, drug dosage, frequency and duration of treatment, generic name or brand name prescribed and availability of drug in formulary consultation time, dispensing time, knowledge of patient about correct dosage and cost spent on injection was collected. Data was obtained through the patient file and through interview with patients and health facility.

DATA ANALYSIS

WHO core drug use indicator, Patient care indicators, Facility Indicators, Complementary indicators, Number of drugs prescribed per prescription, Dosage formulation prescribed, Different type of drug groups prescribed, different class of antimicrobial agents, most frequently prescribed fixed dose combination were analyzed for their occurrence rates, average and a study on the various high and low levels were done.

STATISTICAL ANALYSIS

Data was entered and analyzed by using Microsoft excel 2007. The value was expressed as actual numbers, percentage and average.

RESULTS AND DISCUSSION

In improving human health drug plays an important role. In order to produce desired effect drugs use should be efficacious and safe. The study was understand the drug prescription pattern using "WHO core use indicators" in out-patients in the ophthalmology hospital. The studies understand the antimicrobial prescription and fixed dose combination in the prescription and rate of occurrences. The drug prescription form was important point contact between doctors and the patients. In this pharmacist play an important role during dispensing and counseling procedure in ophthalmology hospital and pharmacist should give clear idea about the use of medicine to the patients.

PATIENT DEMOGRAPHICDATA

GENDER DISTRIBUTION DATA

Gender distribution data shows clear idea. Total 763 patients were included during the study period. Out of this 369 was males and 394 was females. In Gender distribution shows female patient was more than males. Health problem such as diabetic and blood pressure most seen in women than male these problems directly linked with ophthalmology problem so this female patient was more than male in the case of ophthalmology problem.

Table1: Gender distribution data

Gender	No of Patients (N=763)	Total Percentage (%)
Male	369	48%
Female	394	52%

Gender distribution show the female are more than male patient. 763 patients were consulted with ophthalmologist. About 52% of patient populations were female.

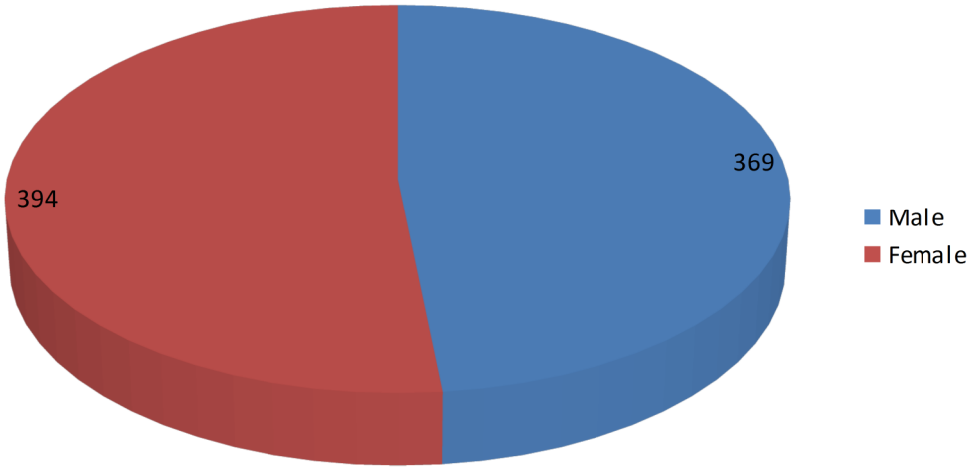

Figure: 1 Gender distribution data

AGE WISE DISTRIBUTION DATA

There was no significant relationship between age and ophthalmology problem. In the age wise distribution data shows that highest number of patient consulted with ophthalmologist their age ranges from between 0 - 10 and Patients their age ranges from 81 - 90 years has least consulted with ophthalmologist

Table2: Age wise distribution data

Age range in years	**0-10 in (yrs)**	**11-20 in (yrs)**	**21-30 in (yrs)**	**31-40 in (yrs)**	**41-50 in (yrs)**	**51-60 in (yrs)**	**61-70 in (yrs)**	**71-80 In (yrs)**	**81-90 In (yrs)**
Number of patients (N=763)	122	107	92	69	84	84	107	53	45%
Percentage to total	16%	14%	12%	9%	11%	11%	14%	7%	6%

In age wise distribution shows clear idea about ranges of patient age consulted with ophthalmologist. 122 patient were consulted with ophthalmologist which patient age ranges from 5 month to 10 years as percentage of 16, followed by 107 patients were consulted with ophthalmologist which patient age ranges from 11- 20 years as percentage of 14 to total ,92 patients was consulted with ophthalmologist which patient age ranges from 21 – 30 years as percentage of 12 to total, 69 patient care was consulted with ophthalmologist which patients age ranges from 31– 40 years as percentage of 9 to total.

84 patient consulted with ophthalmologist which patients age ranges from 41-50 years as the percentage of 11 to total, 84 patient were consulted by ophthalmologist which patients age ranges 51 -60 years as the percentage of 11 to total,107 patient were consulted with ophthalmologist which patients age ranges from 61-70 years as percentage of 14 to total.

53 patient were consulted with ophthalmologist which patients age ranges from 71-80 years as percentage of 7 to total, 45 patients were consulted with ophthalmologist which patients age ranges 81 to 90years as percentage of 6 to total. Patient their age 5 month to 10 years were highest consulted with ophthalmologist and patient their age ranges from 81 to 90 were least consulted with ophthalmologist.

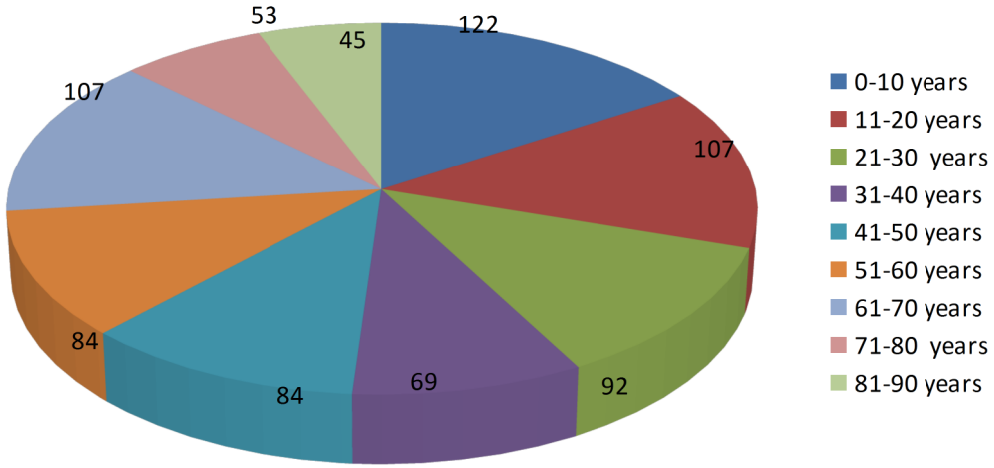

Figure 2: Age wise distribution data

NUMBER OF DRUGS PRESCRIBED PER PRESCRIPTION

In this study seven hundred and sixty three prescription (N=763) was analyzed and the total number of drug products prescribed were one thousand two hundred and fourty three (1243)**.** The number of drugs per prescription varied from one to four. Drug dosage frequency and duration of treatment record was **97% (741/763), 97 %(741/763**) and **96.46 % (736/769)** of prescription respectively.

Table 3: Number of drugs prescribed per prescription

Prescription containing number of drugs	Number of prescriptions (N=763)	Number of prescription (%)
0	115	15.07
1	247	33.37
2	254	33.28
3	100	13.10
4	47	6.15

Number of drug prescribed per prescription contain one drugs **247 (15.07%)** followed by **two drugs 254 (33.37%),** three drugs (**33.28%)** and four drugs **47(6.15%)**. Patient who treated without drug were 115 patients. These patient were suggested glasses or referred to another hospital such as neuro or

diabetic problem. Number of drugs prescribed per prescription contain two drugs were high and four drugs were less.

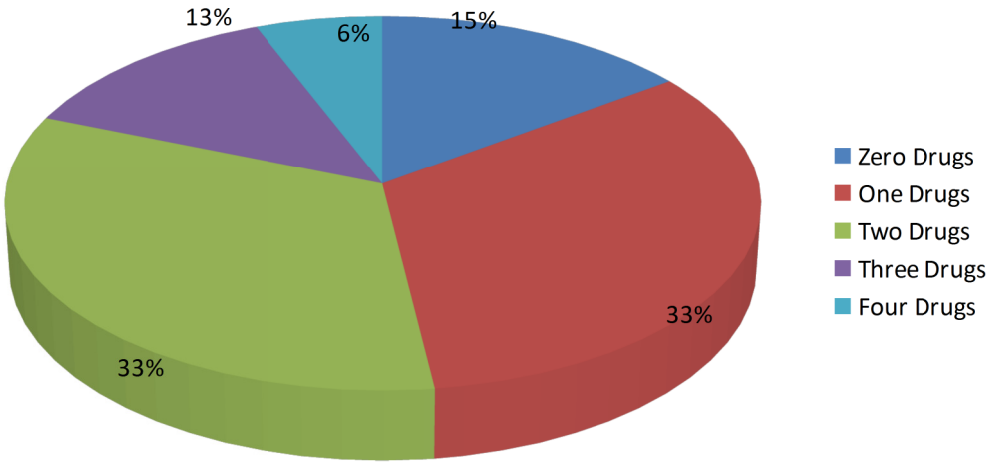

Figure3: Number of drugs prescribed per prescription

WHO INDICATORS

Increases in irrational drug use were one of the common occurrences of today world. By using these indicators such as WHO core drug use indicators, patient care indicators, facility indicators and complementary indicators were pointing towards irrational drug use.

WHO core drug use Indicators consists five individual components such as average number of drug per encounter, percentage of drugs prescribed by generic name, percentage of encounter with antibiotic prescribed, percentage of encounter with an injection prescribed and percentage of drugs prescribed from

formulary. Average of number per number shows degree of polypharmacy, Percentage of drugs prescribed by generic name shows generic name prescribing tendency of prescriber and percentage of encounter with an antibiotic prescribed shows antibiotic prescribing tendency.

Out of total prescribed drugs **98.55% (1225)** drugs were prescribed by brand name and only **1.44% (18)** by generic name. Brand name prescribing was dominated. Uses of antibiotics were frequent and the percentage of encounters cases with antibiotics was **42.20% (322/763).** Percentage of encounters with an injection prescribed were **0.13% (1/763)** and The percentage of drugs prescribed from formulary were **97%** (**1206/1243)** and patient knowledge of correct dosage for prescribed drugs was **75.46%(489/ 648).**

Table 4: Details of drug utilization based on WHO indicators

Indicators Assessed	Data Value
Total Number of prescriptions	1243
Average number of drugs per encounter	1.62%
Percentage of drugs prescribed by generic name	1.44%
Percentage of encounters with an antibiotic prescribed	42.20%
Percentage of encounters with an injection prescribed	0.13%
Percentage of drugs prescribed from Formulary	97%

Average number of drugs per encounter

Average number of drugs per encounter were **1.6.** Average should always maintain low as possible to reduce adverse effect, bacterial resistance level and patient medication cost range. It shows degree of polypharmacy and average value ranges from1.6 to 1.8%. The prescribing error should be low by maintaining the average number and the appropriate use of drugs and drug prescribing pattern will increases the patient benefits in several aspect and also health of public.

Percentage of drugs prescribed by generic name

Percentages of drugs prescribed by generic name were **1.44%.** The result indicates ophthalmologist suggested brand names popularity and increase pharmaceutical companies influence. This shows increase in prescribing error because several brand names similar in spell and sound alike of different pharmacologically drugs. Vitamins were prescribed mainly by generic name.

Percentage of encounters with an antibiotic prescribed

Percentage of encounters with an antibiotic prescribed were **42.20%.** In this study region financial status of patients was very high. The patient was not worry about their cost of drug they wanted rapid relief from diseases and result in increased use of antibiotic cause decrease resistance to bacteria.

Percentage of encounters with an injection prescribed

Percentage of encounters with an injection prescribed were **0.13%.**In this hospital several injection are used in their cost range above 10 thousands and above Only one patient prescribe avastin injection and cost spend on injection was 6500 Rs. Avastin inj was also called bevacizumab injection it was used to treat eye

diseases such as macular degeneration, diabetic retinopathy and retinal vein occlusion.

Percentage of drugs prescribed from Formulary

Percentage of encounters with an antibiotic prescribed was **97%.**This hospital is specialized for eye treatment and the most of drugs prescribed that was available in pharmacy and also there was included in formulary. Below figure the details of drug utilization based on WHO indicators

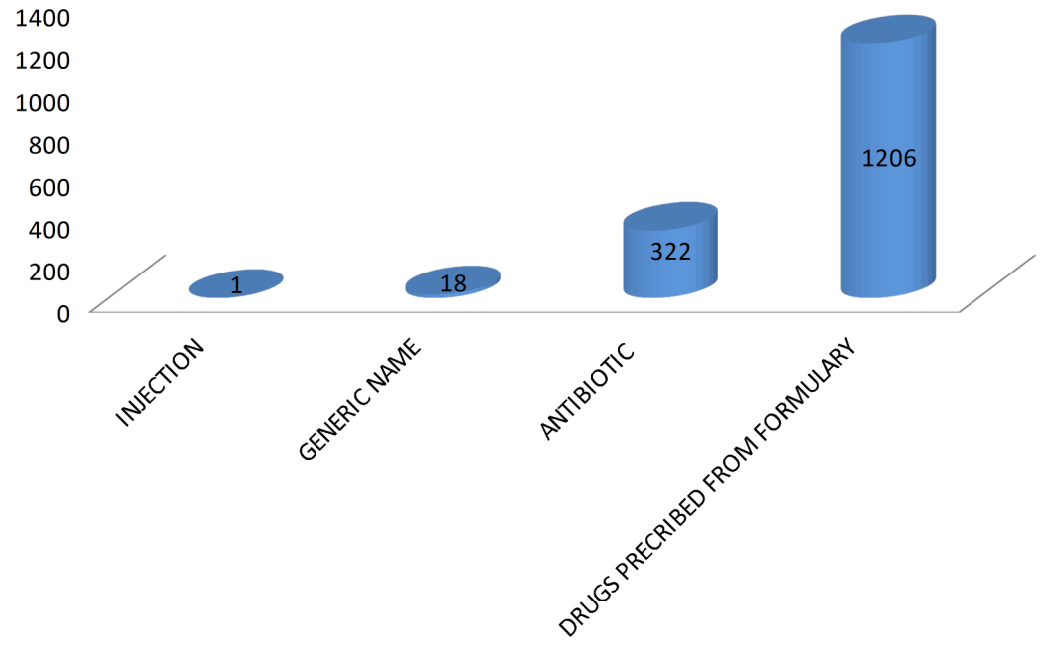

Figure 4: Details of drug utilization based on WHO indicators

PATIENTS' KNOWLEDGE OF CORRECT DOSAGE

Percentages of patients' knowledge of correct dosage were **75.46%.** Total number of patient included in the study were 763 and 159 patient not have knowledge about correct dosage of medication and 489 have correct knowledge about correct dosage of medication.

Table 5: Patient knowledge about correct dosage

Patient knowledge about correct dosage	Number (N=763)	Percentage (%)
Patient without knowledge	159	24.54%
Patient with knowledge	489	75.46%

Patient knowledge about correct dosage reflects the rational drug use. Mainly ophthalmology prescription consists of eye drops, ointment that prescribed in different dose in regular fixed intervals so pharmacists must give knowledge to patient about usage of medicine and major factors related to the patient knowledge were age and education because genetics patients or illiterate patient were difficult to understand way to usage of drugs.

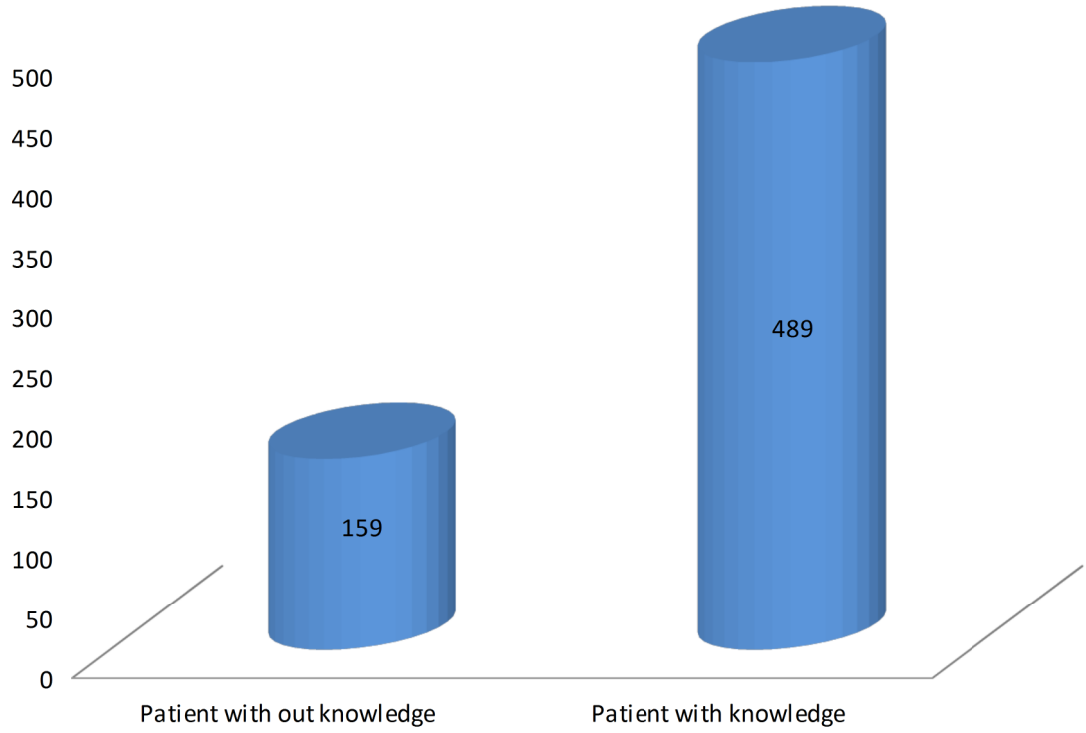

Figure 5: Patient knowledge for correct dosage

PATIENT CARE INDICATORS

The patient care indicators consist of three components such as consultation time, dispensing time and percentage of drug actually dispensed.

CONSULTATION TIME

The average consultation was **6.84min**. Before consulting with the ophthalmologist. The patients were send to one or more optometry and the ophthalmologist consul the patient with the result that obtains from optometry and finally drug was prescribed. In some cases such as injury patient directly consulted with ophthalmologist.

Table 6: Consultation Time

Time in (min)	Number of patients (N=763)	Total Percentage (%)
0-5min	115	15%
5-10 min	497	65%
Above 10min	151	20%

Totally 763 patients were consulted with ophthalmologist. In this 115 patient have taken time below 5 minutes for consultation ,497 patient taken time between 5 to 10 minutes and 151 patient have taken time above 10 min. The consultation time was little high compared to another department of other hospitals. The result shows the consultation was high compared to other department of other hospital.

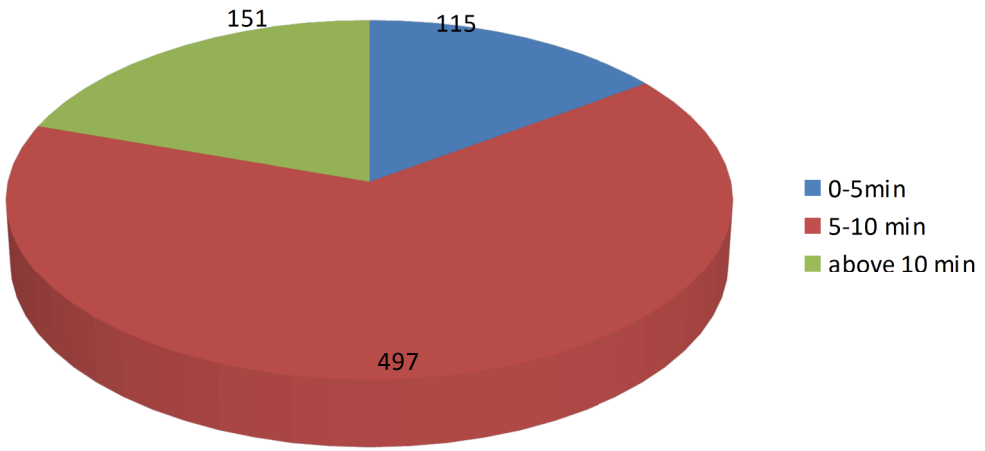

Figure 6: consultation time

DISPENSING TIME

Average dispensing time was **331 sec.** In ophthalmology drugs were prescribed by different dose such as one or two drops respectively at regular intervals the pharmacist should given clear idea to patient or patient bystanders about usage of drugs through verbal or nonverbal method. The dispensing time was between 5 to 15 minutes.

Table 7: Dispensing Time

Time in (min)	Number (N=763)	Total Percentage (%)
0-5 min	501	77%
5-10 min	100	16%

Out of 763 patient 115 patient have not prescribe any drug and 501 patient taken dispensing time between 0-5 minutes, 100 patient taken dispensing time between 5-10 minutes and 47 patient taken dispensing time above 10 minutes. The dispensing time taken in eye hospital is high when compared to another department of other hospital because prescription consists mainly eye drops, ointments which are prescribed in different doses at regular interval so pharmacist have lot of time for the dispensing.

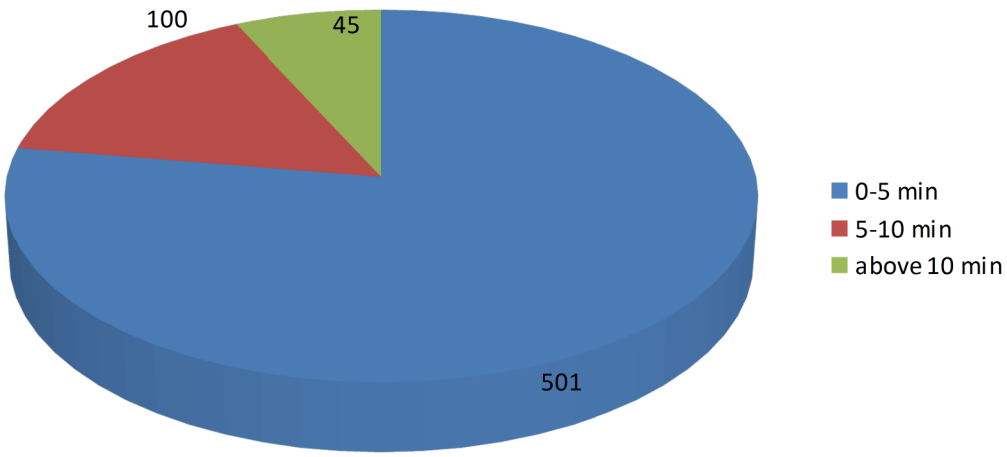

Figure 7: Dispensing time

Average number of drug actually dispensed

Percentage of average number of drugs actually dispensed was **98%.** In this 763 patients was consulted by the ophthalmologist in which 648 patients has prescribed drugs and the total prescribed drug was 1243 out of this 1224 drug was dispensed. The results shows most of the prescribed drugs are dispensed from hospital pharmacy its self.

Table 8: Total dispensed drugs

Drugs data	Number of drugs
No of prescribed drugs	1243
No of dispensed drugs	1224

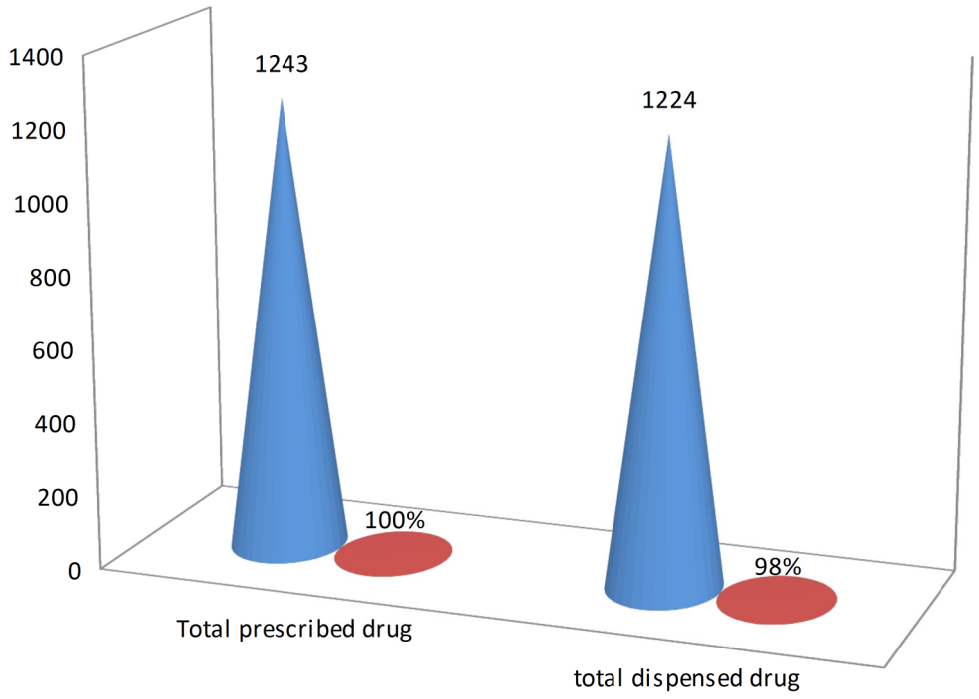

Figure 8: Number of drugs actually dispensed

Facility Indicators

Availability of drugs from formulary was mainly indicators in facility parameters. Totally1224 drug was dispensed for 763 patients in which 1206 drugs was available in formulary. Percentage of drugs prescribed from Formulary was **97%.**

Complimentary Indicators

In the study 115 patients were not prescribed any drug and the percentage of patient treated without drug is **15.07%.** In 763 patients only one patient prescribed injection and brand name of the injection was avastin contain bevazcizumab molecules used for degeneration of macular, occlusion of retinal

vein etc. The cost of injection was **6500 Rs** Below figure shows one of the complimentary indicators.

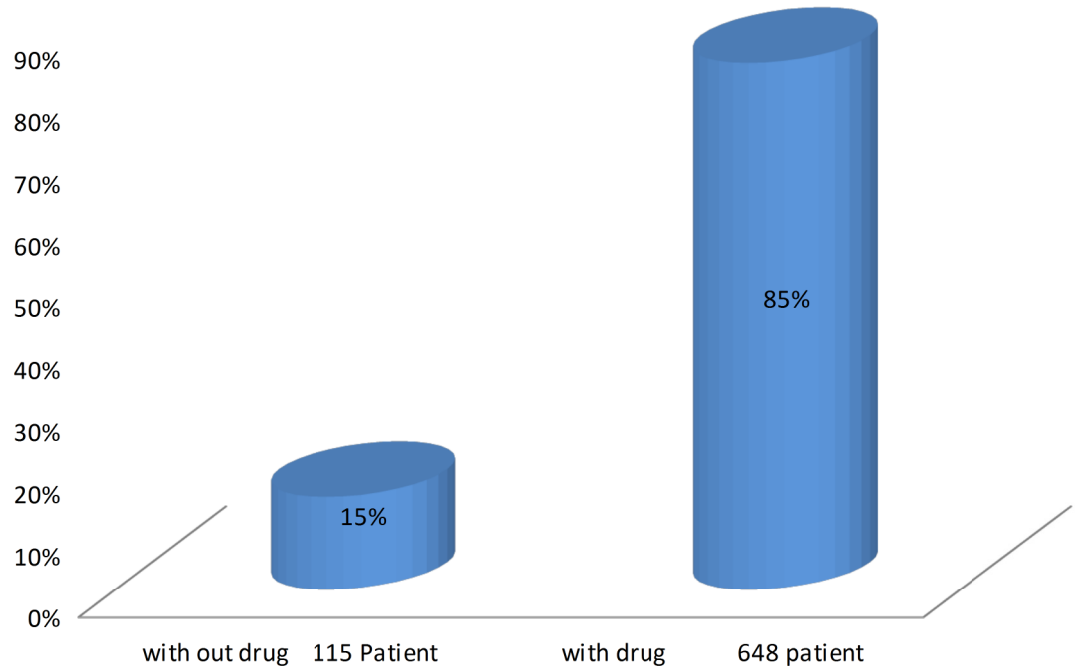

Figure 9 : The complimentary indicators

DOSAGE FORMULATION PRESCRIBED

Drugs were prescribed in six different dosage forms. Eye drops were the most commonly prescribed 839 (67.49%) dosage form, followed by tablet 219 (17.45%), ointment 119 (9.57 %), capsules 41 (3.29 %),gel 24 (1.93%)and injection 1 (0.08%). eye drops were the most commonly prescribed dosage formulation, while injections were the least commonly prescribed dosage formulation.

Table 9: Dosage formulation prescribed

Dosage formulation	Number of patients (N=763)	Total Percentage (%)
Eye drop	839	67.49 %
Tablet	219	17.45%
Ointment	119	9.57%
Capsules	41	3.29%
Gel	24	1.93%
Injection	1	0.08%

Eye drops most commonly prescribed dosage form for opthalmology treatment mainly all types of dosage groups such as antibiotic, steriods, artifical tear and anti glucoma drugs are mainly prescribed in drops form for eye diseases. NSAIDs and vitamins mainly prescribed in tablet form and antibiotic are mainly prescribed in ointment and gel form, vitamins are prescribed in capsules or tablet form.

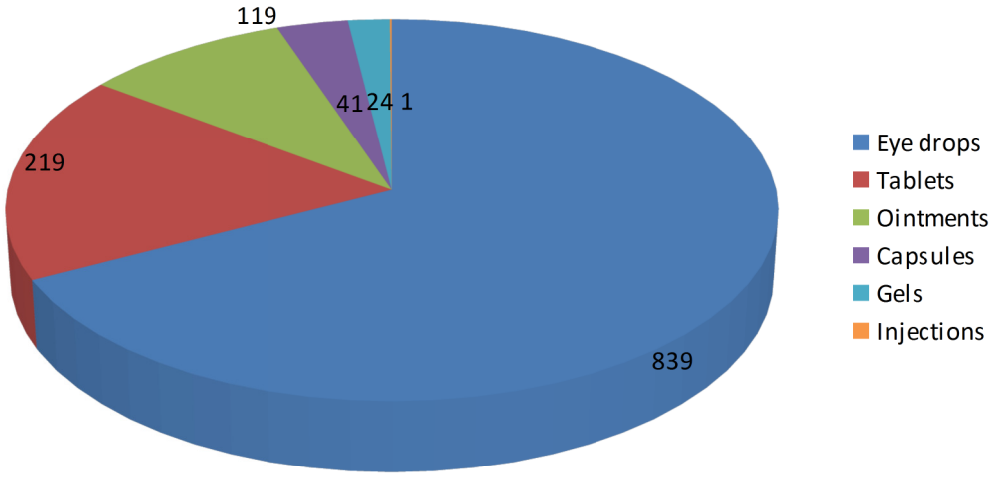

Figure 10:Different type of Dosage formulation prescribed

DRUG GROUPS PRESCRIBED

Total drugs prescribed in 763 patients were 1243. Antimicrobials agents was most commonly prescribed drugs in 379(30.49%) of the patients, artificial tear 293 (23.57 %) was the second most common drug prescribed, while NSAIDS 248(19.95 %) at third position. steriods179 (14.40%), vitamin 106(8.52%), anti glaucoma 38(3.05%).Antibiotic was most commonly prescribed drug group mainly prescribed in drop, ointment, tablet and gel forms.

Table10: Different type of drugs groups prescribed

Type	Number (Out of 1243) N=763	Total percentage
Antibiotics	379	30.49%
Ocular lubricant/Artificial tears	293	23.57%
NSAIDs	248	19.95 %
Steroids	179	14.40%
Vitamins	106	8.52%
Anti-Glaucoma drugs	38	3.05%

Antibiotics are used in both single dose combination and fixed dose combination and prescribed topically to reduce the systemic adverse effect., NSAIDS are mainly prescribed in tablet form in double dose combination, Steroids was prescribed in double dose combination mainly with antibiotic and NSAIDS, Vitamins was prescribed in tablet or capsules form, Anti-Glaucoma are mainly prescribed in drop forms respectively.

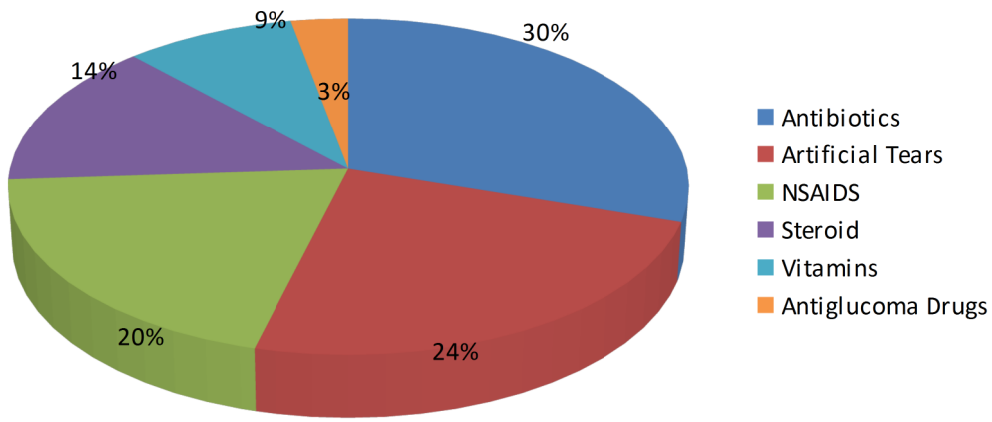

Figure11: Drug Group type prescribed

DIFFERENT CLASS OF ANTIMICROBIAL AGENTS

In this study about 1243 drugs were prescribed out of this **379** antimicrobial agents were prescribed. An antimicrobial agent was prescribed mainly for infective and allergic conjunctivitis. The increase of antibiotic indicates nutrition and poor sanitation of the study region. Mainly financial status of people in the study region is not bad so they demand rapid relief from diseases this also influence the prescribing frequency of antimicrobials.

Table 11: Prescribing frequency of antimicrobial agents

Antimicrobial Class	Number (Out of 379)	Percentage
Fluroquinolone	218	58%
Chloramphenicol	81	21%
Aminoglycoside	55	15 %
Macrolide	25	7%

Fluroquinolones were most common prescribed antimicrobial agent. It is mainly prescribed for bacterial conjunctivitis. Fluroquinolones accounted for **57.51% (218/379**) of the total antimicrobials, of which Gatifloxacin, moxifloxacin, ofloxacin, ciprofloxacin were prescribed among the Fluoroquinolones. Chloramphenicol accounted for **21.37% (81/379**) of the total antimicrobial agent, Aminoglycoside accounted for **14.51 % (55/379)** of the total antimicrobial agent of which tobramycin was prescribed among aminoglycoside. Macrolide accounted for **6.59% (25/379**) of the total antimicrobial agent of which azithromycin were prescribed among macrolide.

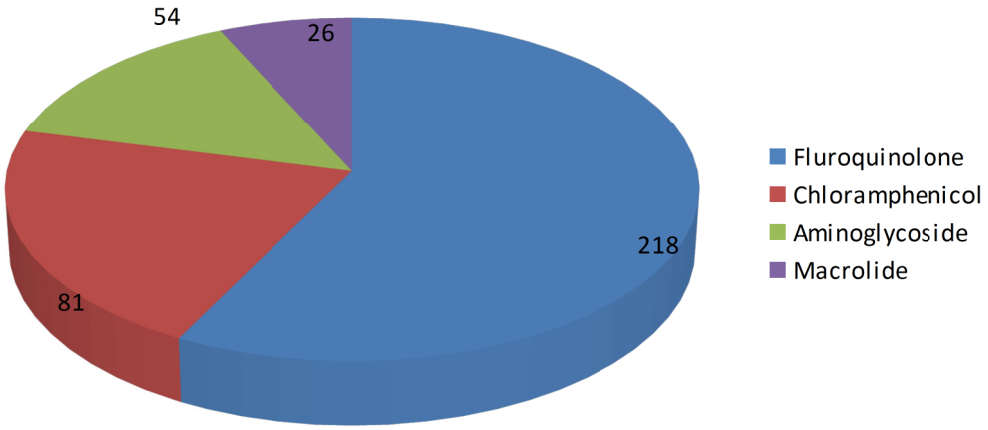

Figure12: **Prescribing frequency different class of antimicrobial agents**

Most frequently prescribed fixed dose combination

Out of total 763 patients frequently prescribed fixed dose combination was aceclofenac with serratiopeptidase combination is **117(15.33%),** followed by tobramycin with flurometholone is **33(4.32%),** chloramphenicol with Dexamethasone is **31(4.06%),** oflaxacin with Dexamethasone is **29 (3.80%).**

Table 12: Most frequently prescribed fixed dose combination

Combinations Drugs	Number of patients (N=763)	Total Percentage (%)
Aceclofencac + Serratiopeptidase	117	15.33 %
Tobramycin +Flurometholone	32	4.19 %
Chloramphenicol + Dexamethasone	31	4.06 %
Oflaxacin +Dexamethasone	29	3.80 %

Most frequently prescribed fixed dose combination was aceclofenac with serratiopeptidase combination of NSAIDS and proteolytic enzyme mainly for pain, inflammation and swelling and it was prescribed in tablet form. Second is tobramycin with flurometholone is combination of antimicrobial and steroids mainly for eyelids infection and inflammation and it was prescribed in drop form. Chloramphenicol with Dexamethasone is combination of antimicrobial and steroid used for bacterial eye infection and anti-inflammatory and it was prescribed in drop form and Ofloxacin with Dexamethasone is a combination of antimicrobial and steroids that is prescribed in drop form.

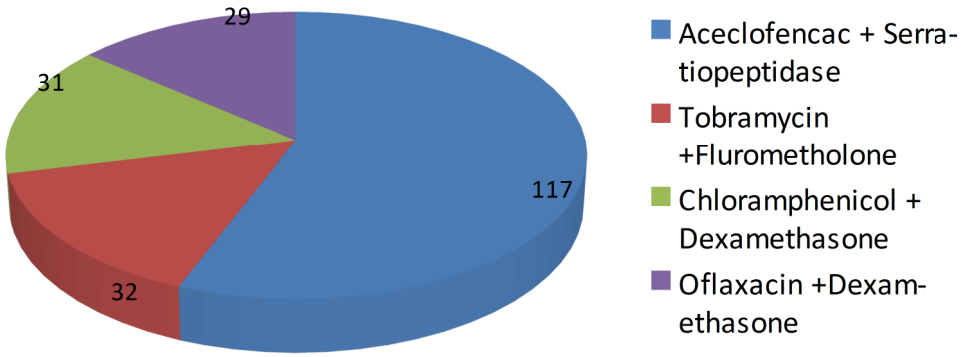

Figure 13 : Most frequently prescribed fixed dose combination.

Aceclofenac with serratiopeptidase combination mainly prescribed is tablet (zerodol.S), tobramycin with flurmetholone combination mainly prescribed is eye drop (toba-f) ,chloramphenicol with dexamethasone combination is prescribed eye drop (deximon) and oflaxacin with dexamethasone combination mainly prescribed is eye drop (oflaxac-D)

CONCULSION

This is observational study done in out-patient department of ophthalmology hospital. The study population was 763 patients and study of drug prescription pattern using "WHO core drug use indicators"

For 763 patient 1243 drugs are prescribed and average number of drugs per encounter was 1.62 this value shows poly pharmacy was less, out of 1243 prescribed 18 drugs are prescribed by generic name this shows ophthalmologist promote brand name popularity. Percentage of drugs prescribed by generic name is 1.44%. About 379 antibiotic drugs are prescribed from 1243 prescribed drugs this indicates use of antibiotic was high and percentage of antibiotic prescribed was 42.20%.

Out of 1243 drugs prescribed only one drug are prescribed injection form and percentage of encounter with injection prescribed was 0.13%. Only one patient prescribed avastin injection and cost spent on avastin injection is 6500 Rs. Percentage of drugs prescribed from formulary was 97% and this value indicates most of the prescribed drugs from formulary.

Number of drug prescribed per prescription contain one drugs 247(15.07%) followed by two drugs 254(33.37%), three drugs (33.28%) and four drugs 47(6.15%). Drugs were prescribed in six different dosage forms. Eye drops were the most commonly prescribed 839 (67.49%) dosage form, followed by tablet 219 (17.45%), ointment 119 (9.57 %), capsules 41 (3.29 %), gel 24 (1.93%) and injection 1 (0.08%). Eye drops were the most commonly prescribed dosage

formulation, while injections were the least commonly prescribed dosage formulation.

Antimicrobials agents was most commonly prescribed drugs in 379(30.49%) of the patients, artificial tear 293 (23.57 %) was the second most common drug prescribed, NSAIDS 248(19.95 %) at third position. steriods179 (14.40%), vitamin 106(8.52%) and anti glaucoma 38(3.05%).Out of 1243 drugs prescribed 379 antibiotics are precribed in which fluroquinolones accounted for 57.15% (218/379) , chloramphenicol accounted for 21.37%(81/379) of the total antimicrobial agent Aminoglycoside accounted for 14.51%(55/379) of the total antimicrobial agent and macrolide accounted for 6.59% (25/379) of the total antimicrobial agent .

Most frequently prescribed fixed dose combination was aceclofenac with serratiopeptidase combination is 117(15.33%) followed by tobramycin with flurometholone is 33(4.32%)**,** Chloramphenicol with Dexamethasone is 31(4.06%) and Ofloxacin with Dexamethasone is 29 (3.80%). This shows the use of antibiotic was high.

LIMITATIONS OF THE STUDY

- Only 763 patient had taken for this study and study population is less but higher numbers of patients are required for better result.
- It's only limited to ophthalmology and this type of study should be conducted on another department also.
- The study is done at single centre. For better result multi centre study is required.
- The study limited to only out-patient department.

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To study the drug Prescription pattern using "WHO core drug use indicator" in out patients in an Opthalmology hospital

SL NO: **Data Collection Form** **Date:**

Hospital :		**File No:**
Patient Name:	Age:	Sex : Male ☐ Female ☐

Current Problem

☐ Red Eye ☐ Incthing ☐ Eye Pain
☐ Foreign body sensation ☐ Swelling ☐ Raised Intraocular Pressure
☐ Blurring ☐ Injury

Past Medical History

☐ None ☐ Lung Diseases ☐ Kidney Diseases
☐ Gout ☐ High Blood Pressure ☐ Diabetes
☐ High Cholesterol ☐ Copd ☐ Allergy

Current Medication

Anti microbial Agents	Yes	☐	No	☐	NSAIDS	Yes	No	☐
Antiglucoma Agent	Yes	☐	No	☐	Artificial Tear	Yes	No	☐
Ocular Decongesent	Yes	☐	No	☐	Steroid	Yes	No	☐
Vitamins	Yes	☐	No	☐	Herbal Drugs	Yes	No	☐

Dosage Formulation Prescribed

Eye Drop	Yes	☐	No	☐	Ointment	Yes	☐	No	☐	Capsule	Yes ☐	No ☐
Gel	Yes	☐	No	☐	Injection	Yes	☐	No	☐	Tablet	Yes ☐	No ☐

CURRENT MEDICATION

Sl. No.	**Drug prescribed Generic/ Brand Name**	**Dose**	**Dosage Form**	**Route**	**Frequency**	**Duration**

REVIEW - 2			
Who Core Drug Prescription Indicator	**Data Value**	**No**	**%**

Number Of Drugs per Encounter				
Drugs Prescribed by Generic name				
Encounter with Antibiotic prescribed				
Encounter with injection prescribed				
Drugs Prescribed from formulary				
Patient Knowledge about Correct Dosage				
Patient care indicator				
Consultation Time	0-5 min ☐	5-10 min ☐	Above 10 min ☐	
Dispensing Time	0-5 min ☐	5-10 min ☐	Above 10 min ☐	
Drug actually dispensed	1 ☐	2 ☐	3 ☐	All ☐
Facility Indicators				
Availability of drugs from formulary		Yes ☐	No ☐	
Complimentary Indicators				
Patient treated without drugs		Yes ☐	No ☐	
Drug Cost per injection		Yes ☐	No ☐	

PATIENT CONSENT FORM

I have read/been briefed on the study "**the drug prescription pattern using "WHO core drug use indicators" in out-patient in an ophthalmology hospital"** and I voluntarily agree to participate in this

study which may or may not be beneficial me. Its general purpose, potential benefits, possible hazards, and inconveniences have been explained to me up to my satisfaction. I have the option to withdraw from the study at any stage. I here by give my consent for this study.Rm³ CXp-hm-bn¨p a\-Ên-em¡n "**To study of the drug prescription pattern using "WHO core drug use indicators" in out-patient in an ophthalmology hospital" At Thrissur District, Kerala"** F¶ Cu]T\¯nsâ Cu `mK-am-sW¶v kzta-[b a\-Ên-em-¡p-¶p. ]n¶oSv {]tXy-In¨v ImcWw ImWn-¡msX Xs¶ F\n¡v CXnÂ \n¶pw ]n³·m-dm³ Ah-Im-i-ap-v. Cu ]T-\-¯nsâ `mK-am-hm³ Rm³ k½-Xn-¡p-¶p F¶v km£y-s¸-Sp-¯p-Ibpw sN¿p-¶p.

Name of Patient: Signature of patient

Place:

Date: